CLAIMS

1. An aluminium alloy product with high strength and fracture toughness and a good corrosion resistance, said alloy comprising, in weight %:

Zn	about 6.5 to 9.5
Mg	about 1.2 to 2.2
Cu	about 1.0 to 1.9
Fe	< about 0.3
Si	< about 0.20

optionally one or more of:

Zr	< about 0.5
Sc	< about 0.7
Cr	< about 0.4
Hf	< about 0.3
Mn	< about 0.8
Ti	< about 0.4
V	< about 0.4,

and other impurities or incidental elements each < 0.05, total < 0.15, and the balance being aluminium.

2. Aluminium alloy product according to claim 1, wherein $[(0.9 \times Mg)-0.6] \leq Cu \leq [(0.9 \times Mg) + 0.05]$.

3. Aluminium alloy product according to claim 1, wherein $[(0.9 \times Mg)-0.5] \leq Cu \leq [0.9 \times Mg]$.

4. Aluminium alloy product according to claim 1, wherein $[(0.9 \times Mg)-0.5] \leq Cu \leq [(0.9 \times Mg) - 0.1]$.

5. Aluminium alloy product according to claim 1, wherein the Fe-content is

<0.14% and the Si-content is <0.12%.

6. Aluminium alloy product according to claim 1, wherein the Fe-content is <0.08 and the Si-content is <0.07%.

7. Aluminium alloy product according to claim 1, wherein

Zn	about 6.5 to 7.9
Mg	about 1.4 to 2.10
Cu	about 1.2 to 1.80.

8. Aluminium alloy product according to claim 5, wherein

Zn	about 6.5 to 7.9
Mg	about 1.4 to 1.95
Cu	about 1.2 to 1.75.

9. An aluminium alloy product according to claim 1, wherein the lower-limit for the Zn-content is 6.7%.

10. An aluminium alloy product according to claim 1, wherein the lower-limit for the Zn-content is 6.9%.

11. Aluminium alloy product according to claim 1, wherein the Zr-content is in a range of at most 0.3%.

12. Aluminium alloy product according to claim 1, wherein the Zr-content is in a range of at most 0.15%.

13. Aluminium alloy product according to claim 1, wherein the Zr-content is in a range of 0.04 to 0.15%.

14. Aluminium alloy product according to claim 1, wherein the Zr-content is in a range of 0.04 to 0.11%.

15. Aluminium alloy product according to claim 1, wherein the Cr-content is in a range of at most 0.3%.

15. Aluminium alloy product according to claim 1, wherein the Cr-content is in a range of at most 0.15%.

16. Aluminium alloy product according to claim 1, wherein the Cr-content is in a range of 0.04 to 0.15%.

17. Aluminium alloy product according to claim 1, wherein the Mn-content is in a range of at most 0.02%.

18. Aluminium alloy product according to claim 1, wherein the Mn-content is in a range of at most 0.01%.

19. Aluminium alloy product according to claim 1, wherein the Mn-content is in a range of 0.05 to 0.30%.

20. Aluminium alloy product according to claim 1, wherein the Mn-content is in a range of 0.05 to 0.15%.

21. Aluminium alloy product according to claim 1, wherein the Mn-content is in a range of 0.05 to 0.11%.

22. Aluminium alloy product according to claim 1, wherein the sum of Mn+Zr is less than 0.4%.

23. Aluminium alloy product according to claim 1, wherein the sum of Mn+Zr is less than 0.32%.

24. Aluminium alloy product according to claim 1, wherein the sum of Mn+Zr is more than 0.14%.

25. Aluminium alloy product according to claim 1, wherein the Mg content is at least 1.90%.

26. Aluminium alloy product according to claim 1, wherein the Mg content is at least 1.92%.

27. An aluminium alloy product according to claim 1, said alloy consisting essentially of, in weight %:

Zn	6.5 to 9.5
Mg	1.2 to 2.2
Cu	1.0 to 1.9
Fe	< 0.3
Si	<0.20

optionally one or more of:

Zr	< 0.5
Sc	< 0.7
Cr	< 0.4
Hf	< 0.3
Mn	< 0.8
Ti	< 0.4
V	< 0.4,

and other impurities or incidental elements each <0.05, total <0.15, and the balance being aluminium.

28. Aluminium alloy product according to claim 1, wherein the product has an EXCO corrosion resistance of "EB" or better.

29. Aluminium alloy product according to claim 1, wherein the product has an EXCO corrosion resistance of "EA" or better.

30. Aluminium alloy product according to claim 1, wherein the product is in the form of a sheet, plate, forging or extrusion.

31. Aluminium alloy product according to claim 1, wherein the product is in the form of a sheet, plate, forging or extrusion as part of an aircraft structural part.

32. Aluminium alloy product according to claim 1, wherein the product is fuselage sheet, upper wing plate, lower wing plate, thick plate for machined parts, forging or thin sheet for stringers.

33. Aluminium alloy product according to claim 1, wherein the product has a thickness in the range of 0.7 to 3 inch at its thickest cross sectional point.

34. Aluminium alloy product according to claim 1, wherein the product has a thickness of less than 1.5 inch.

35. Aluminium alloy product according to claim 34, wherein the product has a thickness of less than 1.0 inch.

36. Aluminium alloy product according to claim 1, wherein the product has a thickness of more than 2.5 inch.

37. Aluminium alloy product according to claim 36, wherein the product has a thickness in the range of 2.5 to 11 inch.

38. Aluminium alloy product according to claim 1, which in an extrusion having a thickness in the range of at most 10 mm at its thickest cross sectional point.

39. Aluminium alloy product according to claim 1, which is an extrusion having a thickness in the range of 2 to 6 inch at its thickest cross sectional point.

40. Aluminium alloy product with high strength and fracture toughness and a good corrosion resistance, wherein the alloy consists essentially of, in weight percent:

Zn	7.2 to 7.7
Mg	1.79 to 1.92
Cu	1.43 to 1.52
Zr or Cr	0.04 to 0.15
Mn	at most 0.19
Si	< 0.07
Fe	<0.08
Ti	<0.05,

impurities each <0.05, total <0.15, and balance aluminium.

41. Aluminium alloy product according to claim 40, wherein $[(0.9 \times Mg)-0.6] \leq Cu \leq [(0.9 \times Mg) + 0.05]$.

42. Aluminium alloy product according to claim 40, wherein $[(0.9 \times Mg)-0.5] \leq Cu \leq [0.9 \times Mg]$.

43. Aluminium alloy product according to claim 40, wherein $[(0.9 \times Mg)-0.5] \leq Cu \leq [(0.9 \times Mg) - 0.1]$.

44. Aluminium alloy product according to claim 40, wherein the Zr or Cr content is in the range of 0.06 to 0.10%.

45. Aluminium alloy product according to claim 40, wherein the Mn-content is <0.02%.

46. Aluminium alloy product according to claim 45, wherein the Mn-content is <0.01%.

47. Aluminium alloy product according to claim 40, wherein the Mn-content is in the range of 0.05 to 0.19%.

48. Aluminium alloy product according to claim 47, wherein the Mn-content is in the range of 0.09 to 0.19%.

49. Aluminium alloy product according to claim 47, wherein the sum of Mn+Zr is less than 0.4%.

50. Aluminium alloy product according to claim 47, wherein the sum of Mn+Zr is less than 0.32%.

51. Aluminium alloy product according to claim 47, wherein the sum of Mn+Zr is more than 0.14%.

52. Aluminium alloy product according to claim 40, wherein the product is in the form of a sheet, plate, forging or extrusion.

53. Aluminium alloy product according to claim 40, wherein the product has a thickness of less than 1.5 inch.

54. Aluminium alloy product according to claim 40, wherein the product has a thickness of less than 1.0 inch.

55. Aluminium alloy product according to claim 40, wherein the product has a thickness of more than 2.5 inch.

56. Aluminium alloy product according to claim 55, wherein the product has a thickness in the range of 2.5 to 11 inch.

57. Aluminium alloy product according to claim 40, wherein the product is in the form of a sheet, plate, forging or extrusion as part of an aircraft structural part.

58. Aluminium alloy product according to claim 40, wherein the product is fuselage sheet, upper wing plate, lower wing plate, thick plate for machined parts, forging or thin sheet for stringers.

59. Aluminium alloy product according to claim 40, which in an extrusion having a thickness in the range of at most 10 mm at its thickest cross sectional point.

60. Aluminium alloy product according to claim 40, which is an extrusion having a thickness in the range of 2 to 6 inch at its thickest cross sectional point.

61. Aluminium alloy product according to claim 40, wherein the product has an EXCO corrosion resistance of "EB" or better.

62. Aluminium alloy product according to claim 40, wherein the product has an

EXCO corrosion resistance of "EA" or better.

63. Aluminium alloy product according to claim 40, which is a plate product having a thickness of 2.5 inch or more and exhibiting increased elongation in the ST-testing direction compared to its AA7050 counterpart.

64. Aluminium alloy product according to claim 63, which plate product has an elongation in the ST-testing direction of 5% or more.

65. Aluminium alloy product according to claim 63, which plate product has an elongation in the ST-testing direction of 5.5% or more.

66. Aluminium alloy product according to claim 40, which is a plate product having a thickness of 2.5 inch or more and exhibiting a fracture toughness Kapp improvement of at least 20% compared to its AA7050 aluminium alloy counterpart in the L-T testing direction at ambient room temperature and when measured at S/4 according to ASTM E561 using 16-inch centre cracked panels.

67. Aluminium alloy product according to claim 40, which is a plate product having a thickness of 2.5 inch or more and exhibiting a fracture toughness Kapp improvement of at least 20% compared to its AA7050 aluminium alloy counterpart in the L-T testing direction at ambient room temperature and when measured at S/4 according to ASTM E561 using 16-inch centre cracked panels.

68. Aluminium alloy product with high strength and fracture toughness and a good corrosion resistance, wherein the alloy consists essentially of, in weight percent:

Zn	7.2 to 7.7
Mg	1.90 to 1.97
Cu	1.43 to 1.52

Zr or Cr	0.04 to 0.15
Mn	at most 0.19
Si	< 0.07
Fe	<0.08
Ti	<0.05,

impurities each <0.05, total <0.15, and balance aluminium.

69. Aluminium alloy product according to claim 68, wherein $[(0.9xMg)-0.6] \leq Cu \leq [(0.9xMg) + 0.05]$.

70. Aluminium alloy product according to claim 68, wherein $[(0.9xMg)-0.5] \leq Cu \leq [0.9xMg]$.

71. Aluminium alloy product according to claim 68, wherein $[(0.9xMg)-0.5] \leq Cu \leq [(0.9xMg) - 0.1]$.

72. Aluminium alloy product according to claim 68, wherein the Zr or Cr content is in the range of 0.06 to 0.10%.

73. Aluminium alloy product according to claim 68, wherein the Mn-content is <0.02%.

74. Aluminium alloy product according to claim 73, wherein the Mn-content is <0.01%.

75. Aluminium alloy product according to claim 68, wherein the Mn-content is in the range of 0.05 to 0.19%.

76. Aluminium alloy product according to claim 75, wherein the Mn-content is in the range of 0.09 to 0.19%.

77. Aluminium alloy product according to claim 75, wherein the sum of Mn+Zr is less than 0.4%.

78. Aluminium alloy product according to claim 75, wherein the sum of Mn+Zr is less than 0.32%.

79. Aluminium alloy product according to claim 75, wherein the sum of Mn+Zr is more than 0.14%.

80. Aluminium alloy product according to claim 68, wherein the product is in the form of a sheet, plate, forging or extrusion.

81. Aluminium alloy product according to claim 68, wherein the product is in the form of a sheet, plate, forging or extrusion as part of an aircraft structural part.

82. Aluminium alloy product according to claim 68, wherein the product is fuselage sheet, upper wing plate, lower wing plate, thick plate for machined parts, forging or thin sheet for stringers.

83. Aluminium alloy product according to claim 68, wherein the product has a thickness of less than 1.5 inch.

84. Aluminium alloy product according to claim 68, wherein the product has a thickness of less than 1.0 inch.

85. Aluminium alloy product according to claim 68, wherein the product has a thickness in the range of 0.7 to 3 inch at its thickest cross sectional point.

86. Aluminium alloy product according to claim 68, wherein the product has a thickness of more than 2.5 inch.

87. Aluminium alloy product according to claim 86, wherein the product has a thickness in the range of 2.5 to 11 inch.

88. Aluminium alloy product according to claim 68, which in an extrusion having a thickness in the range of at most 10 mm at its thickest cross sectional point.

89. Aluminium alloy product according to claim 68, which is an extrusion having a thickness in the range of 2 to 6 inch at its thickest cross sectional point.

90. Aluminium alloy product according to claim 68, wherein the product has an EXCO corrosion resistance of "EB" or better.

91. Aluminium alloy product according to claim 68, wherein the product has an EXCO corrosion resistance of "EA" or better.

92. Aluminium alloy product according to claim 68, which is a plate product having a thickness of 2.5 inch or more and exhibiting increased elongation in the ST-testing direction compared to its AA7050 counterpart.

93. Aluminium alloy product according to claim 68, which plate product has an elongation in the ST-testing direction of 5% or more.

94. Aluminium alloy product according to claim 68, which plate product has an elongation in the ST-testing direction of 5.5% or more.

95. Aluminium alloy product according to claim 68, which is a plate product having a thickness of 2.5 inch or more and exhibiting a fracture toughness Kapp improvement of at least 20% compared to its AA7050 aluminium alloy counterpart in the L-T testing direction at ambient room temperature and when measured at S/4 according to ASTM E561 using 16-inch centre cracked panels.

96. Aluminium alloy product according to claim 68, which is a plate product having a thickness of 2.5 inch or more and exhibiting a fracture toughness Kapp improvement of at least 20% compared to its AA7050 aluminium alloy counterpart in the L-T testing direction at ambient room temperature and when measured at S/4 according to ASTM E561 using 16-inch centre cracked panels.

97. An aluminium alloy structural component for a commercial jet aircraft, said structural component made from an aluminium alloy product according to claim 1.

98. An aluminium alloy structural component for a commercial jet aircraft, said structural component made from an aluminium alloy product according to claim 40.

99. An aluminium alloy structural component for a commercial jet aircraft, said structural component made from an aluminium alloy product according to claim 68.

100. Method of producing a high-strength, high-toughness AA7xxx-series alloy product having a good corrosion resistance, comprising the processing steps of:

a.) casting an ingot having a composition according to claim 1;

b.) homogenising and/or pre-heating the ingot after casting;

c.) hot working the ingot into a pre-worked product by one or more methods selected from the group consisting of: rolling, extruding and forging;

d.) optionally reheating the pre-worked product and either,

e.) hot working and/or cold working to a desired workpiece form;

f.) solution heat treating said formed workpiece at a temperature and time sufficient to place into solid solution essentially all soluble constituents in the alloy;

g.) quenching the solution heat treated workpiece by one of spray quenching or immersion quenching in water or other quenching media;

h.) optionally stretching or compressing of the quenched workpiece;

i.) artificially ageing the quenched and optionally stretched or compressed workpiece to achieve a desired temper.

101. Method according to claim 100, wherein during processing step i.) the alloy product is artificially aged to a temper selected from the group consisting of T6, T74, T76, T751, T7451, T7651, T77 and T79.

102. Method according to claim 100, wherein during processing step h.) the alloy product has been stretched in a range at most 8%.

103. Method according to claim 100, wherein during processing step b.) the ingot has been homogenised at a temperature in the range of 460 to 490°C.

104. Method according to claim 100, wherein the alloy product has been processed to fuselage sheet.

105. Method according to claim 104, wherein the alloy product has been processed to fuselage sheet having a thickness of less than 1.5 inch.

106. Method according to claim 100, wherein the alloy product has been processed to lower wing plate.

107. Method according to claim 100, wherein the alloy product has been processed to upper wing plate.

108. Method according to claim 100, wherein the alloy product has been processed to an extruded product.

109. Method according to claim 100, wherein the alloy product has been processed to a forged product.

110. Method according to claim 100, wherein the alloy product has been processed to a thin plate having a thickness in the range of 0.7 to 3 inch.

111. Method according to claim 100, wherein the alloy product has been processed to a thick plate having a thickness at most 11 inch.

112. Method of producing a high-strength, high-toughness AA7xxx-series alloy product having a good corrosion resistance, comprising the processing steps of:

a.) casting an ingot having a composition according to claim 68;

b.) homogenising and/or pre-heating the ingot after casting;

c.) hot working the ingot into a pre-worked product by one or more methods selected from the group consisting of: rolling, extruding and forging;

d.) optionally reheating the pre-worked product and either,

e.) hot working and/or cold working to a desired workpiece form;

f.) solution heat treating said formed workpiece at a temperature and time sufficient to place into solid solution essentially all soluble constituents in the alloy;

g.) quenching the solution heat treated workpiece by one of spray quenching or immersion quenching in water or other quenching media;

h.) optionally stretching or compressing of the quenched workpiece;

i.) artificially ageing the quenched and optionally stretched or compressed

workpiece to achieve a desired temper.

113. Method according to claim 112, wherein during processing step i.) the alloy product is artificially aged to a temper selected from the group consisting of T6, T74, T76, T751, T7451, T7651, T77 and T79.

114. Method according to claim 112, wherein during processing step h.) the alloy product has been stretched in a range to at most 8%.

115. Method according to claim 112, wherein during processing step b.) the ingot has been homogenised at a temperature in the range of 460 to 490°C.

116. Method according to claim 112, wherein the alloy product has been processed to fuselage sheet.

117. Method according to claim 112, wherein the alloy product has been processed to fuselage sheet having a thickness of less than 1.5 inch.

118. Method according to claim 112, wherein the alloy product has been processed to lower wing plate.

119. Method according to claim 112, wherein the alloy product has been processed to upper wing plate.

120. Method according to claim 112, wherein the alloy product has been processed to an extruded product.

121. Method according to claim 112, wherein the alloy product has been processed to a forged product.

122. Method according to claim 112, wherein the alloy product has been processed to a thin plate having a thickness in the range of 0.7 to 3 inch.

123. Method according to claim 112, wherein the alloy product has been processed to a thick plate having a thickness of at most 11 inches.